

made up of men who, while they desire to acquire by assiduous reading as much so-called medical science as is thought necessary for them to possess, rightly regard it as their principal duty to devote their energies during their brief period of study to the attainment of skill and experience in the arts of medicine and surgery. But besides these, there is a smaller class of men who not only have time for real study, but possess the necessary previous education in which their fellows are in general so deplorably wanting, and whose motive for work is something higher than that of preparing themselves for examination.

To medical students of this last class the lessons are perfectly adapted. Nor can we conceive that a better course could be followed by a young man intending to fit himself for the higher career of the medical profession, than that laid down by Dr. Foster, namely, that he should at a very early period, *i.e.*, while he is still engaged in the study of the more exact branches of natural science, first work through the course of elementary biology laid down for him in the well-known lessons of Professor Huxley; then that he should devote a considerable proportion of his time during a subsequent year to becoming conversant with the structures and processes peculiar to the bodies of the higher animals, under the guidance of a teacher who must be a real physiologist—all this being accomplished before he begins his proper medical studies, *i.e.*, before he begins to study the details of human descriptive anatomy.

Strange as it may seem, it is not yet sufficiently recognised by those who are concerned in medical education that the men on whom the community depends for enlightenment on the great questions of the preservation of health and the prevention of disease, ought to be practically familiar with all that is known concerning living processes. The remark is frequently made that even to the consulting physician or to the officer of health, physiology and pathology are of relatively little value. Surely this must be a mistake. It may be readily admitted that the ordinary practitioner needs only familiarity with the characteristics of human ailments and the prescribed methods of treatment and skill in the handling of sick people, and may well content himself with as much of the elements of scientific knowledge as he can learn from manuals and lectures; but surely the education of those who are intended to be advisers of the public in relation to health and disease should have some more solid foundation. There can be no question that these men ought to be prepared for their higher functions and responsibilities by such a course of preliminary work in physiology as will enable them, if so be that nature has fitted them for it, to enter with some hope of success on those most difficult of all biological investigations which relate to the nature and causes of diseases.

BRITISH MANUFACTURING INDUSTRIES

British Manufacturing Industries. Edited by G. Phillips Bevan, F.G.S. "Salt, Preservation of Food, Bread, and Biscuits," by J. J. Manley, M.A.; "Sugar Refining," by C. Haughton Gill; "Butter and Cheese," by Morgan Evans; "Brewing, Distilling," by T. A. Pooley, B.Sc., F.C.S. (London: Edward Stanford, 1876.)

THE preface states that in these volumes, of which the present is one, "the facts are gathered together and presented in as readable a form as is compatible with accu-

racy and a freedom from superficiality; and though they do not lay claim to being a technical guide to each industry, the names of the contributors are a sufficient guarantee that they are a reliable and standard work of reference."

This editorial explanation fairly describes the scope of the articles contributed by their respective writers to this volume; since, while not pretending to be a technical guide to each industry, they must prove of great value to all desiring to obtain a *general* knowledge of the processes described. The common fault of encyclopædias of this kind is to devote much space to detailed explanations of manufacturing processes and of the machinery employed. To the ordinary reader all such elaborate details are useless, since his object is to obtain information upon the general principles upon which the various processes are based; and to the manufacturer practically engaged in any process they are equally useless, since no matter how carefully written, they can teach him nothing, because, as a matter of course, he is in advance of the processes described with so much detail.

The first article is an interesting account of "Salt," where found, and how manufactured from the crude deposit. Some valuable statistics are given as to the quantity produced in and exported from England.

The next article on the "Preservation of Food" by the same contributor deals with a subject of increasing importance. Though there has been an important increase, of late years, in the amount of green crops, and in land laid down to grass in the United Kingdom, yet the consumption of beef and mutton has so spread among the working classes, as to render the increased production vastly inadequate to the ever-increasing demand. It has become in consequence a matter of the highest importance to discover means by which animal food may be imported from America, Australia, and other countries where it is abundant.

The chief processes hitherto employed for the preservation of meat are classified by the author under the heads of Drying, Action of Cold, Chemical Reagents, and Exclusion of Air. The drying process has certainly not proved a success. "Charqui," so much praised a few years since, is but a poor substitute for fresh animal food.

The value of ice in preserving meat in cold countries is so well established, that it naturally presents itself as a convenient agent. Hitherto, however, as regards great distances, it has failed. This has arisen from two causes: in the first place the temperature of melting ice is not low enough to prevent change even on ship board; this difficulty will doubtless be overcome by the employment of machines, by which a temperature lower than 0° C. can be maintained at sea. Another difficulty has arisen from the fact that meat kept at the temperature of melting ice is very prone to change so soon as removed from the ice-tanks to be distributed throughout the country. Doubtless in time these and other difficulties will be removed, and our large cities, at least, be supplied with regular arrivals of fresh uncooked meat from South America and our colonies.

The use of chemical reagents has hitherto proved inefficient, but we cannot agree with Mr. Manley "that it is hardly likely that the use of chemicals will solve the question of meat preservation." A patent has lately been granted by which oxygen-absorbing reagents are so suc-

cessfully applied as to give some hope that this or some other chemical process will aid us in this important question.

The author gives some useful details and statistics regarding the "tinned meat" process. This well-known method depends upon the exclusion of air by the substitution of steam, and in the consequent destruction of organic germs. So far as mere preservation is concerned, it has undoubtedly proved a great success, and has already been of some benefit to us; but the long cooking process hitherto employed to expel the air has so destroyed the texture of the meat as to have rendered its use unpopular in spite of the efforts of enthusiasts to force the over-cooked product upon an unwilling public. So soon as the very primitive plan of heating the tins in a bath of chloride of calcium for three or four hours be replaced by one exhausting the air and replacing it by steam at a high temperature successively, and occupying no more than half an hour, then will the tinned meat process prove a real success, and possess many advantages over all others. Mr. Manley has done good service by his description of what has been attempted, and though he suggests but little himself, he may induce some of his readers to experiment upon a matter of such national importance.

The paper on "Sugar Refining" is one of the best contributions in the series, written by one not only an able chemist but also a thoroughly practical sugar refiner. As a clear, accurate, and scientific exposition of an important industry it serves as an example of what such contributions should be. Its only fault is that it is somewhat too brief. After the usual historical account of the industry, the author explains the more important properties of sugar, and shows how these are made use of in the various stages of extraction and purification from the cane and the beet. The author has not considered it within his province to refer to the serious injury to our sugar manufacturers by the heavy export premiums paid by the French nation on all high class products exported to this country. Doubtless so soon as the French financiers have completely extinguished the manufacture of loaf and other high class sugars in England, they will then remove the export premiums, being full well assured that the memory of the ruined English sugar refiners will for a long time at least deter our capitalists from competing with French refineries. Though the "beet" produces one-third of the total amount of sugar grown, and has proved of such value to agriculture on the Continent, yet hitherto the growth of beets for sugar manufacturing purposes has not proved a success in our own country. Nor indeed is it likely to prove remunerative so long as it pays better to grow beef and mutton. In concluding this brief notice we cannot refrain from once more praising the author's valuable—though brief—contribution.

Mr. Evans contributes a short article on dairy produce. He gives some interesting information upon the factory system of cheese-making introduced with so much success into England within the last few years. It is to be regretted that Mr. Evans has given no information upon the mode of preparing the French, Italian, and Swiss cheeses so much appreciated by connoisseurs.

The article on "Brewing and Distilling" is a useful

contribution on two important industries, by one evidently well acquainted with them. Some valuable statistics are given, showing the vast development which has taken place in the production of alcoholic beverages in the United Kingdom. According to the author, on March 31, 1873, there were 31,010 brewers, 144,425 dealers and retailers of beer. The income derived from beer in 1873 amounted to 8,027,408*l.*, a sum which fully explains the hesitation of the present Government to please the agricultural interest by the removal of the malt-tax. In addition to these thirty thousand brewers, of whom, however, only some three thousand are licensed common brewers—there are, it appears, 318 distillers and rectifiers, producing 30,644,750 gallons of spirit, yielding a revenue of 14,895,769*l.*; the number of licences issued in 1875 to persons dealing in and retailing spirits was 138,845. The author calculates that in the brewing and distilling industries, and in those originated and sustained by them, there is a capital of two hundred millions invested. Without following Sir Wilfrid Lawson in all his statements, one cannot but view an annual consumption of twenty-eight to thirty millions of gallons of spirit as a most serious feature in our social life.

Those interested in this matter and desirous of obtaining a general knowledge of the technical processes, will with advantage consult Mr. Pooley's articles. In concluding this notice of the volume before us we must congratulate the publisher and the editor on their success in obtaining the aid of writers so well acquainted with their respective subjects.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

Sea Fisheries

MR. HOLDSWORTH, at the close of his animadversions (*NATURE*, vol. xv. p. 23) on the address I recently delivered in the Biological Section of the British Association at Glasgow, says that he does not know on what evidence I grounded my belief in the decline of our sea-fisheries. I am therefore anxious to state that the evidence to which I trusted in what I then said was mainly, if not entirely, that collected by the Royal Commission of which he was the hard-working secretary. The kindness of my good friend in giving me private notice of his intention to make his comments public enables me the more promptly to furnish a reply to them, and for so doing he has my best thanks.

I do not pretend to have read through the whole of the 1,500 and odd somewhat closely-printed folio pages which form the two "Blue-books" embodying the labours of that Commission. But soon after they appeared—about ten years ago—I looked into them sufficiently, as I thought, to give me a fair notion of their contents. Whether that notion was mistaken your readers will be better able to judge by the time I have done. When I wrote my address I had not these books by me. I have since refreshed my memory by consulting them. I find that deep as was the impression left by my first examination of them it is now still deeper, and were I to write my address over again I should express myself in far stronger terms.

The second and most bulky volume of these blue-books contains the "Minutes of Evidence" taken before the Sea Fisheries Commission, and reports the 61,831 questions and answers put by or given to the Commissioners. At first the attempt to find the particular needles one may be seeking in this immense bottle of hay seems hopeless. But fortunately the volume (as most blue-books are) is furnished with a copious index, extending to 29